

Guiding Framework for the Design of Walkability Analysis Software Tools: Insights from Urban Planning Practitioners

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I. Introduction

The growing need for smarter walkability tools

Problem

Walkability analysis tools have proliferated across academia, industry, and government, promising to support planners, designers, and policymakers in creating more walkable cities.

Despite their increasing prevalence, limited research has systematically examined **how** these tools should be **designed** to align with the needs and workflows of **practitioners** tasked with designing for walkability.

The development processes of related tools remain **unsystematic, incomparable**, and potentially **misaligned** with practitioners' needs.

Research objective

This work presents findings from a practitioner-focused study, centered on **how walkability analysis software tools can be designed** to align with the needs of practitioners.

Through a **hands-on workshop** and an **online tutorial-based** survey with planners, designers, and policymakers, we uncover how urban experts evaluate walkability, which features they value in software tools, and where current tools succeed or fall short.



Contributions

Our findings aim to shed light on areas of **convergence** and **divergence** between practitioners' viewpoints and theory-driven factors affecting walkability.

We identify key challenges and opportunities in the development process of such tools and offer recommendations in the form of a framework to inform the next generation of software tools for walkability planning.

If you want to try CTStreets, CThood, or other open-access walkability & accessibility tools yourself:

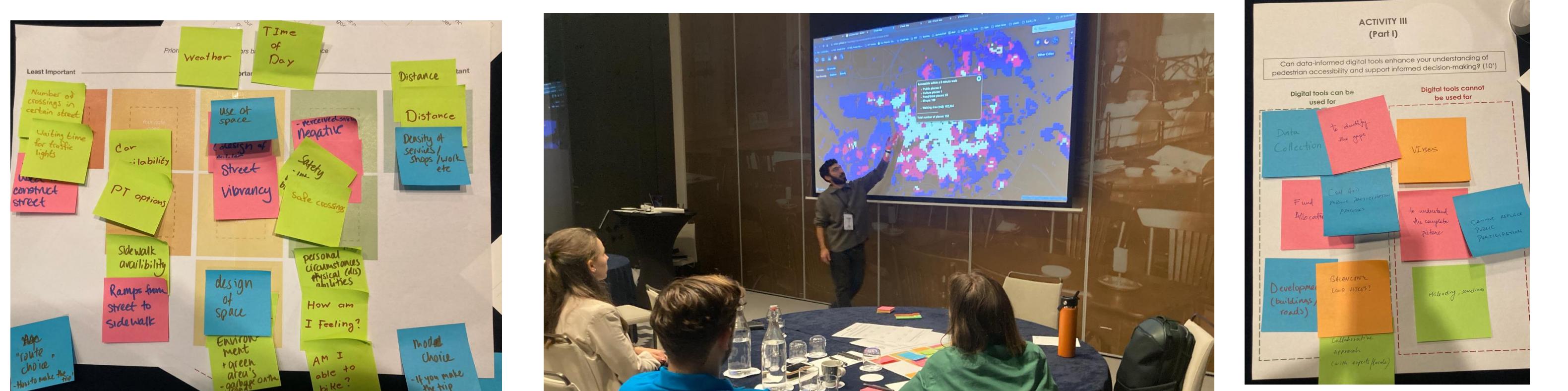


II. Methodology

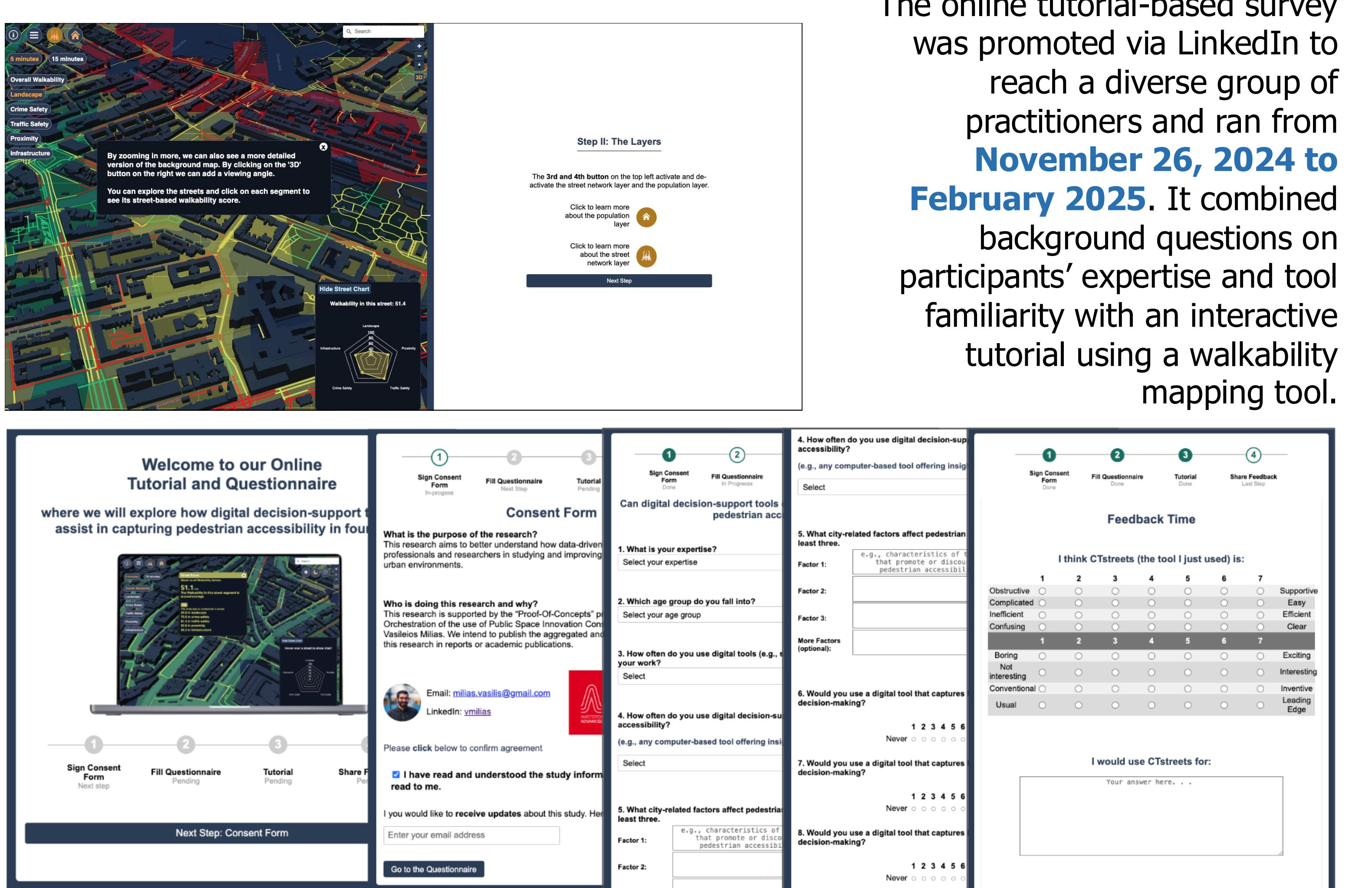
Asking Urban Practitioners

Data Collection - A: Collaborative Workshop

The workshop was realized during the Urbanism Next Europe Conference 2024 in Amsterdam, and involved **20 urban planning practitioners working** in small groups over a three-hour session and **three** activities. Participants, (i) Identified and ranked key walkability factors using Q-methodology, capturing both priorities and discussion insights, (ii) interacted with **CTstreets**, a walkability mapping tool, through a guided hands-on session, (iii) explored how walkability tools support planning practice through group and plenary discussions, with responses collected through structured prompts and **recorded discussions**.



Data Collection - B: Tutorial-Based Survey



Analysis

The analysis of the collected data is divided into a **quantitative** and a **qualitative** analysis part.

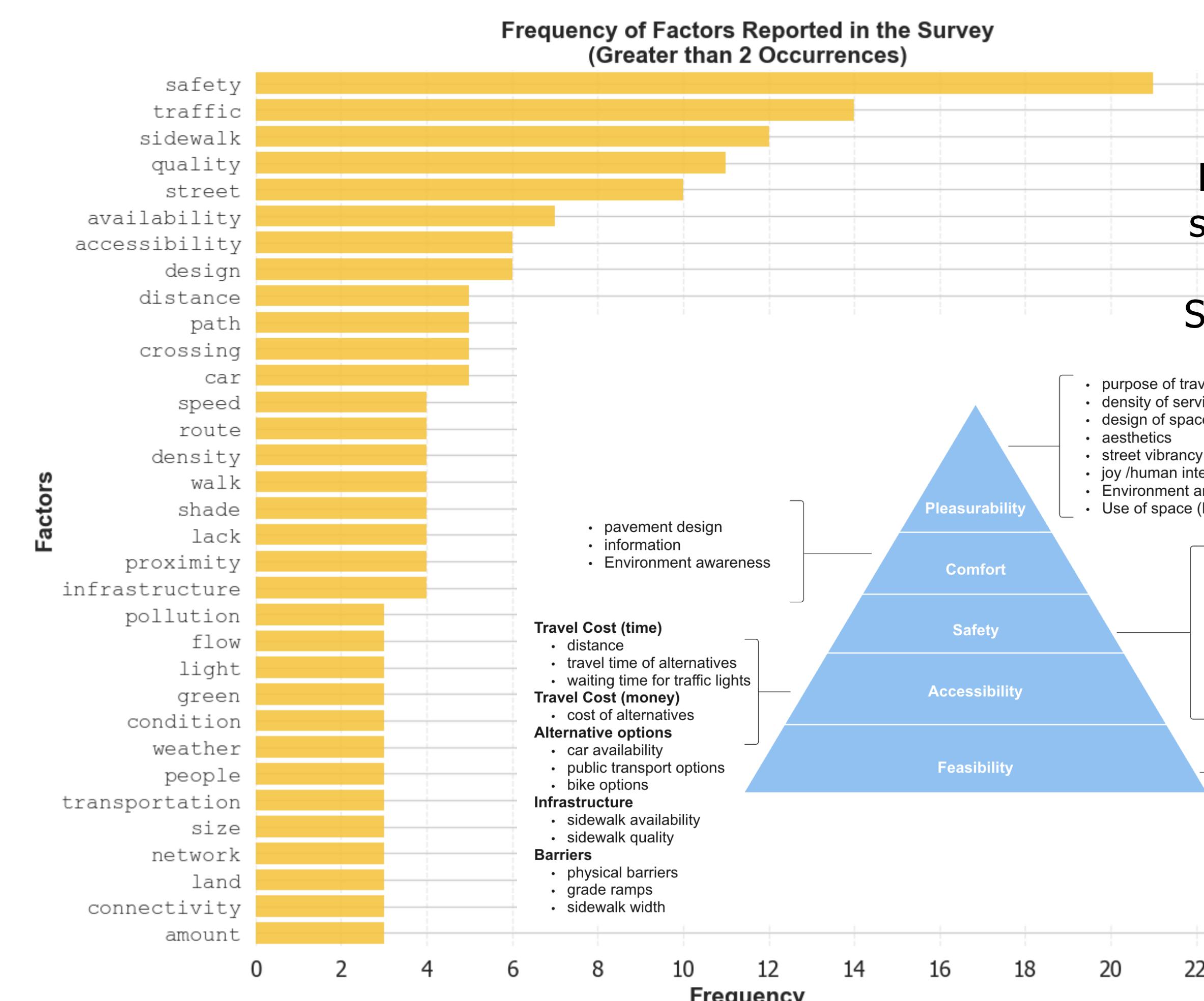
The **quantitative part** examines walkability factors identified and ranked in the workshop and survey, reporting their frequency and relative importance.

The **qualitative part** uses reflexive thematic analysis to analyse the workshop discussions, sticky notes, and open-ended survey responses and capture shared and divergent practitioner perspectives. This analysis addresses: (1) how practitioner-identified walkability factors align with theory, (2) which factors practitioners believe can be captured by digital tools, and (3) which tool features encourage or discourage use, culminating in a guiding framework for walkability tool design.

III. Results

Towards a Framework

What Factors Impact Walkability according to urban practitioners?



Practitioners' views on walkability align with Alfonzo's hierarchy of walking needs. Reported factors span feasibility, accessibility, safety, comfort, and pleusability, with safety and accessibility ranked as most important. Safety includes both traffic and social aspects, while accessibility focuses on distance, infrastructure, and barriers.

Moderators such as **personal characteristics** were also highlighted. Although **pleusability** ranks lower in theory, it was frequently mentioned, reflecting its complexity and importance in practice.

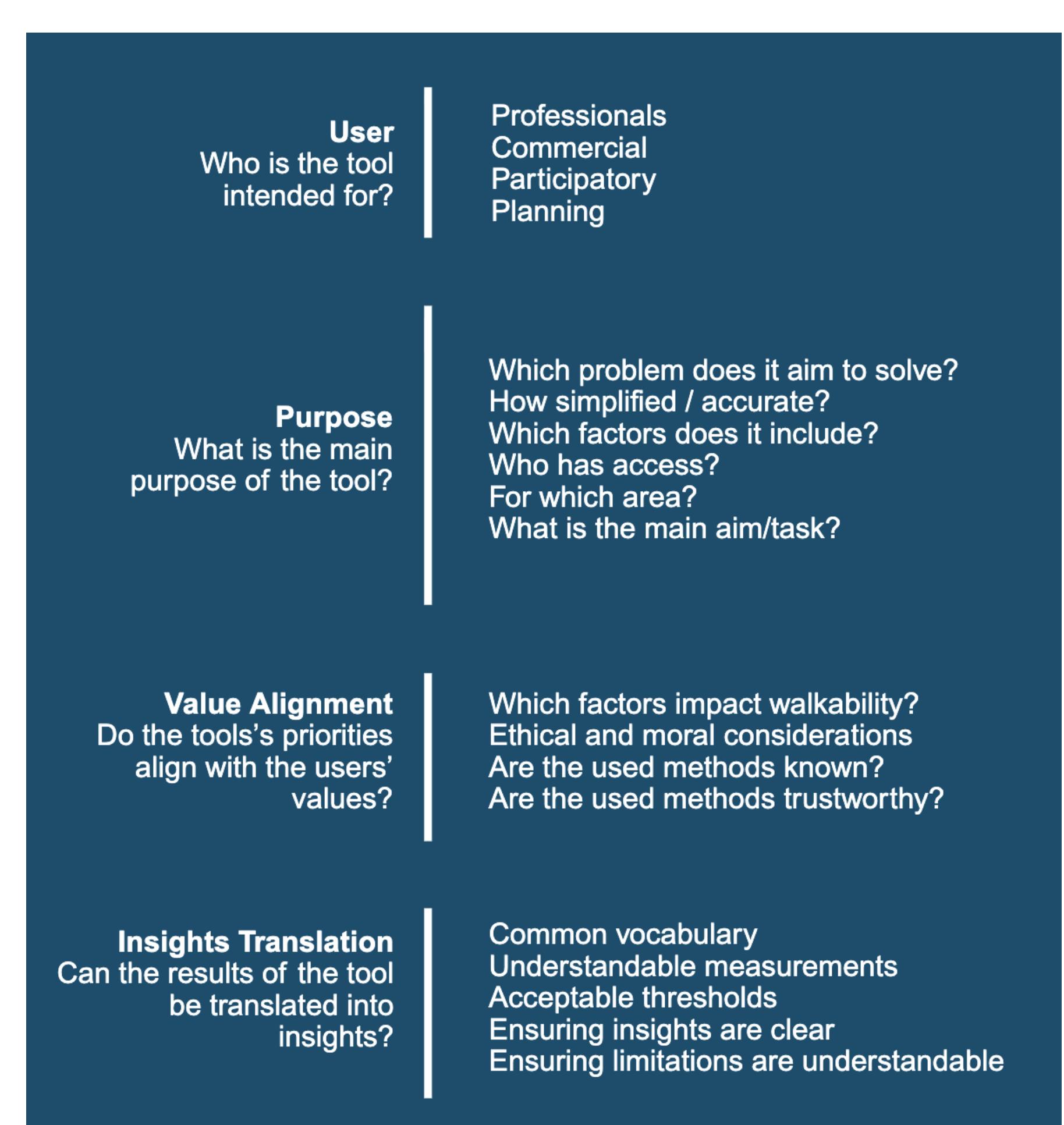
What Factors should be Captured with Digital Tools according to Urban Practitioners?

Survey respondents showed **strong willingness** to use digital tools that capture walkability factors they consider important, with most ratings at the high end of the scale. Many believed that all factors can be digitized, though often with uncertainty or limitations. At the same time, both survey and workshop participants highlighted challenges in capturing subjective and perceptual factors such as safety, comfort, attractiveness, and "vibes."

Workshop discussions were **more skeptical**, emphasizing that tools cannot replace on-site experience and lived perception. In contrast, participants agreed that tools are well suited for **objective factors** and planning tasks, such as accessibility analysis, visualization, scenario testing, and balancing dominant voices in decision-making.

Synthesis and Framework

Synthesizing our findings, we propose a guiding framework for the early design of walkability analysis tools, inspired by Alfonzo's hierarchy of walking needs. The framework defines four hierarchical priorities: **User, Purpose, Value Alignment, and Insights Translation**, each building on the previous one.



It emphasizes that tools must clearly define **who they are for**, what they aim to support, and which values they reflect, while translating analysis into actionable insights. **Misalignment** across these layers reduces **trust** and **usability**, highlighting the need for practitioner-centered tool design.

While frameworks exist for the development of tools in other types domains, such as healthcare there remains a notable gap in research focused on designing walkability analysis software tools. This work contributes to addressing this gap by **opening the door** for new approaches to designing such tools in a more systematic and comparable way.

